GPM and THORPEX

New Era for Global Forecast System

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THORPEX
A GLOBAL ATMOSPHERIC RESEARCH PROGRAMME

Mission Statement

THORPEX is an international research programme to accelerate improvements in the accuracy of 1 to 14-day high-impact weather forecasts for the benefit of society and the economy. It builds upon ongoing advances within the research and operational-forecasting communities. It will make progress by enhancing international collaboration between these communities and with users of forecast products.

Alan Thorpe(2003)

International Science Plan – Version 2 published in August 2003

Four sub-programmes:

- **Dynamical processes and predictability**
- **Observing systems**
- **Data assimilation and observing strategies**
- **Societal and economic applications**

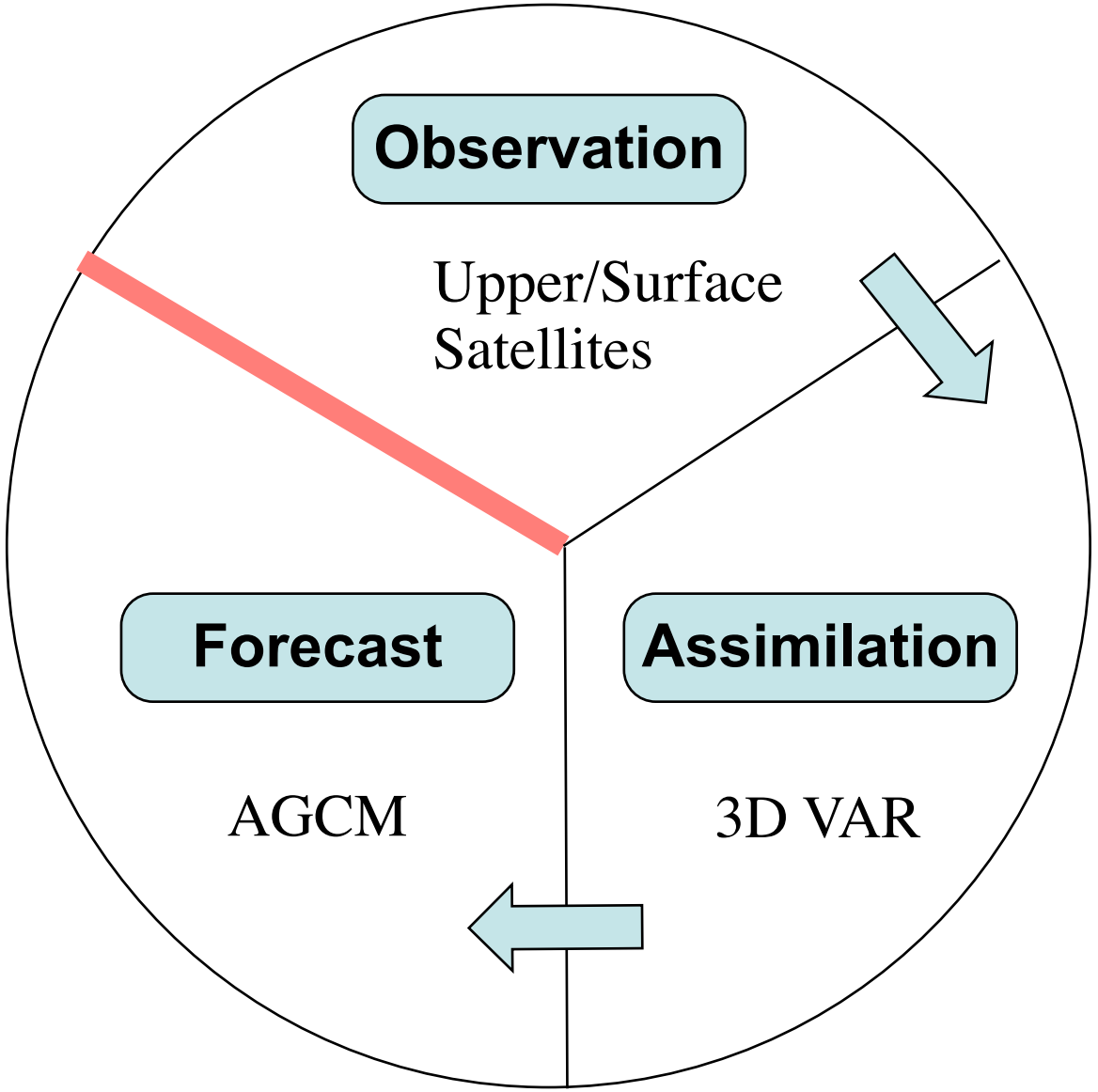
Alan Thorpe(2003)

One Way Forecast System

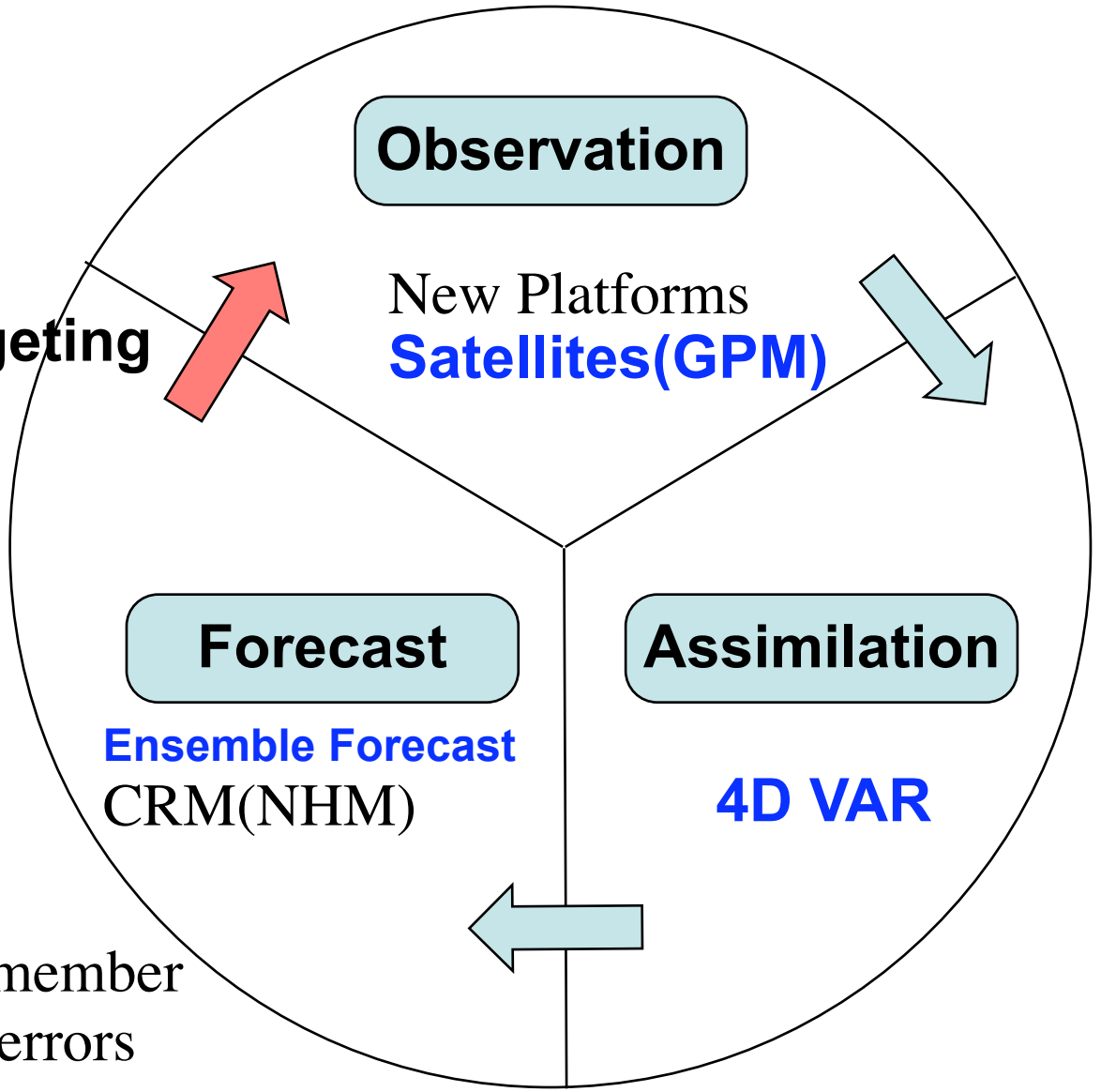
Traditional approach

No feedback from forecast to observation

Equally weighted data



Interactive Forecast System (IFS)



Interaction between forecast and observation

4DVAR guides sensitive area where error grows rapidly

Ensemble Forecast gives member spread originated from initial errors

Satellite obs. over sensitive area give better forecast

-> Discriminating data

Precipitation Measurement by GPM is critical for Asian THORPEX

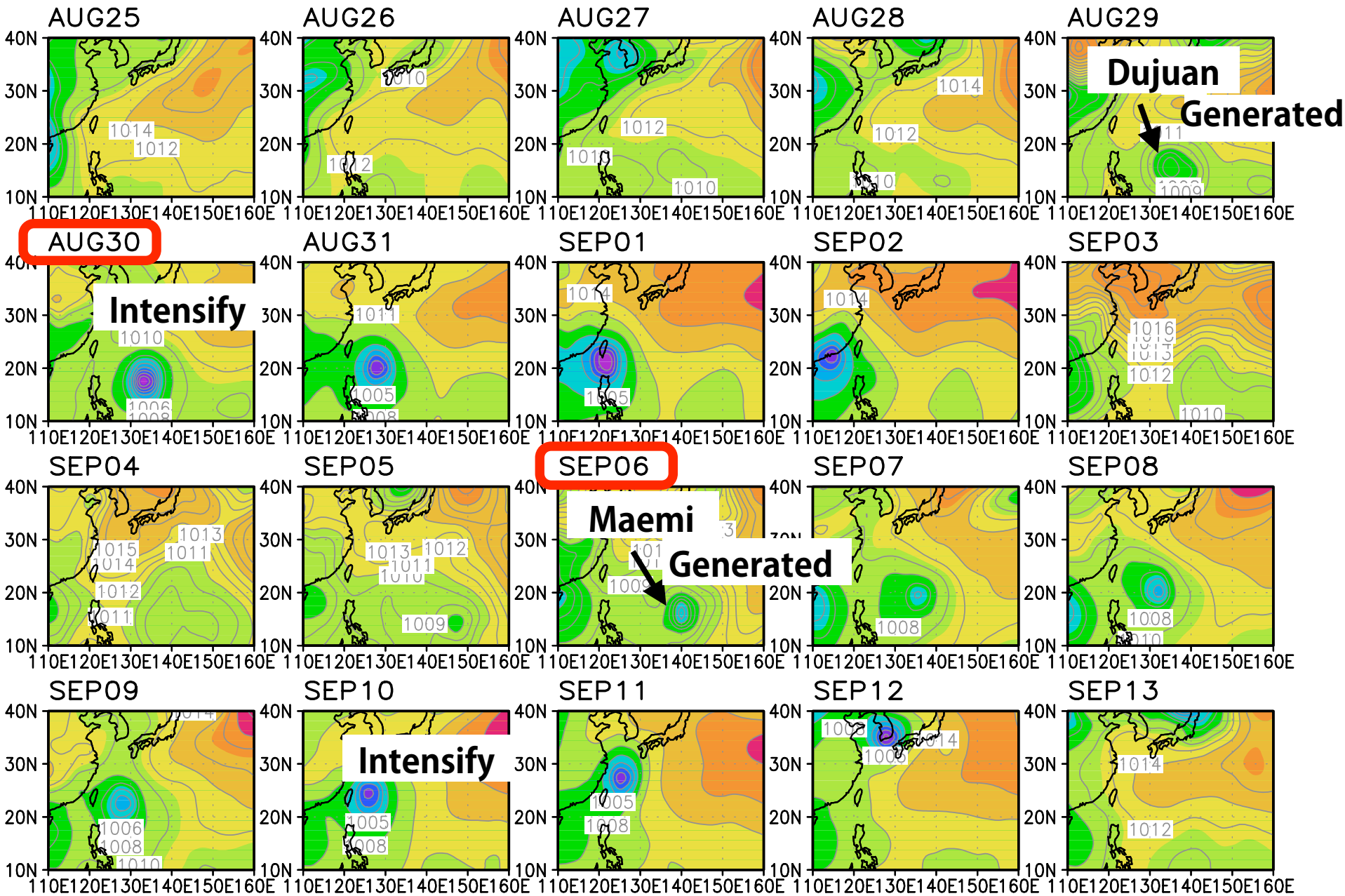
- Cloud Resolving Model with Moist 4DVar
  - initialization of solid/liquid hydrometeor
  - good for monsoon area with heavy rainfall
  - essential for typhoon forecast

-> some more years to go!

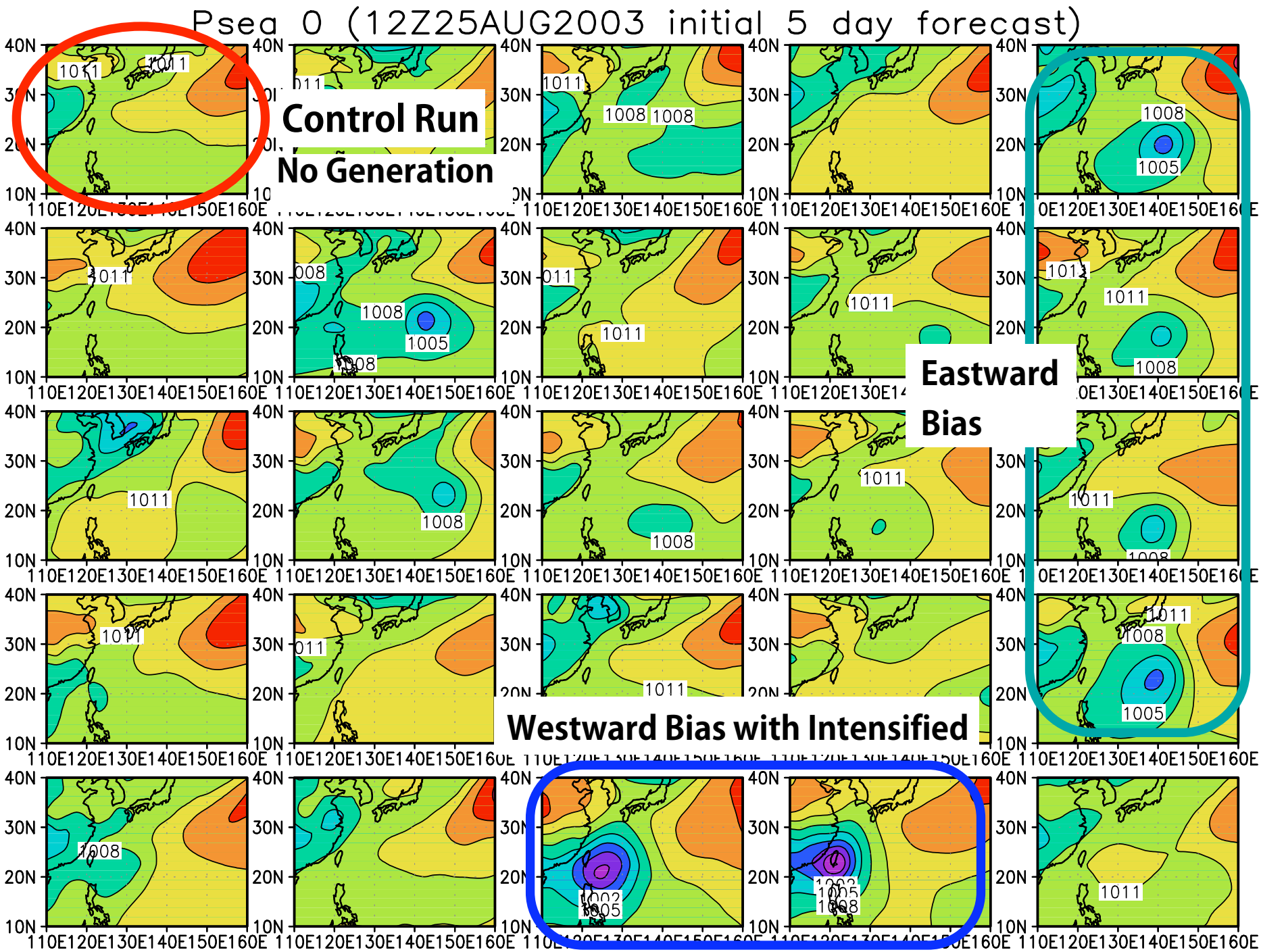
Global Ensemble Prediction System in JMA

Prediction Frequency	Once a day, starting at 12UTC
Maximum Forecast Period	216 hours (9 days)
Numerical Forecast Model	JMA GSM (T106L40)
Grid Numbers ; Spatial Resolution	320×160 ; 1.125 deg.
Vertical Layers ; Uppermost Layer	40 ; 0.4hPa
Ensemble Members	25
Perturbation Generation Method	Breeding of Growing Mode Method （12 mode pairs, 12 hour cycle）
Perturbation Area	North of 20°S

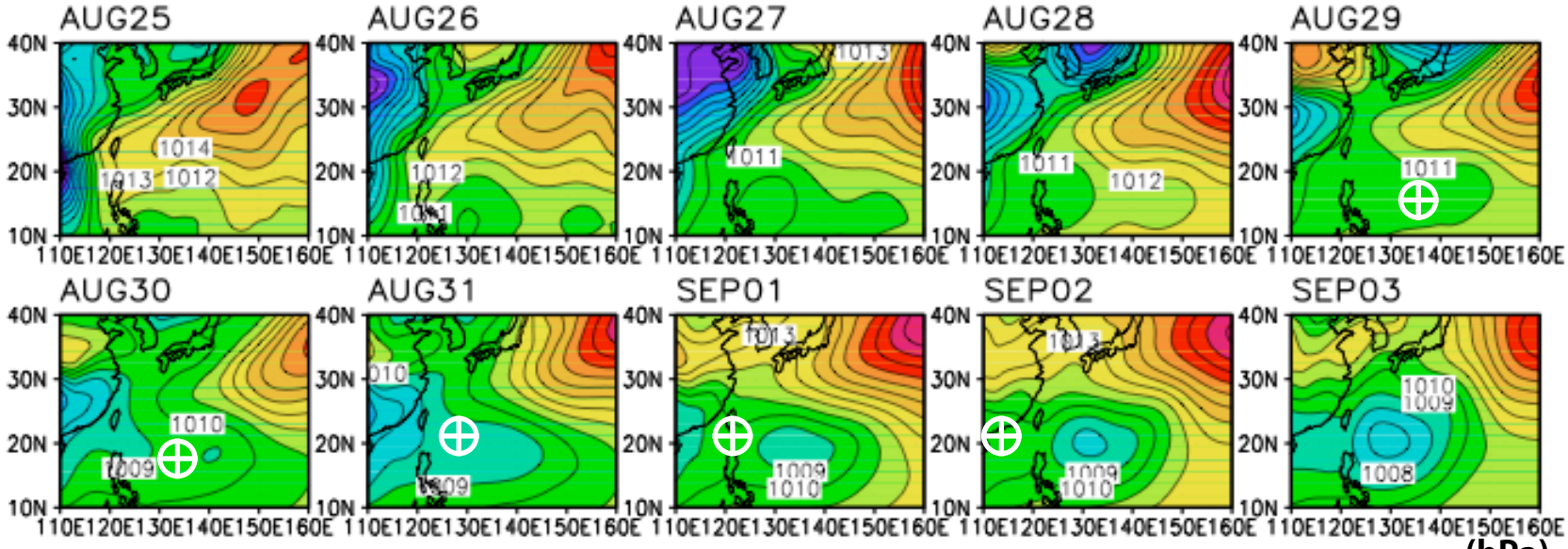
Analysis: Surface Pressure for Typhoon Dujuan and Maemi



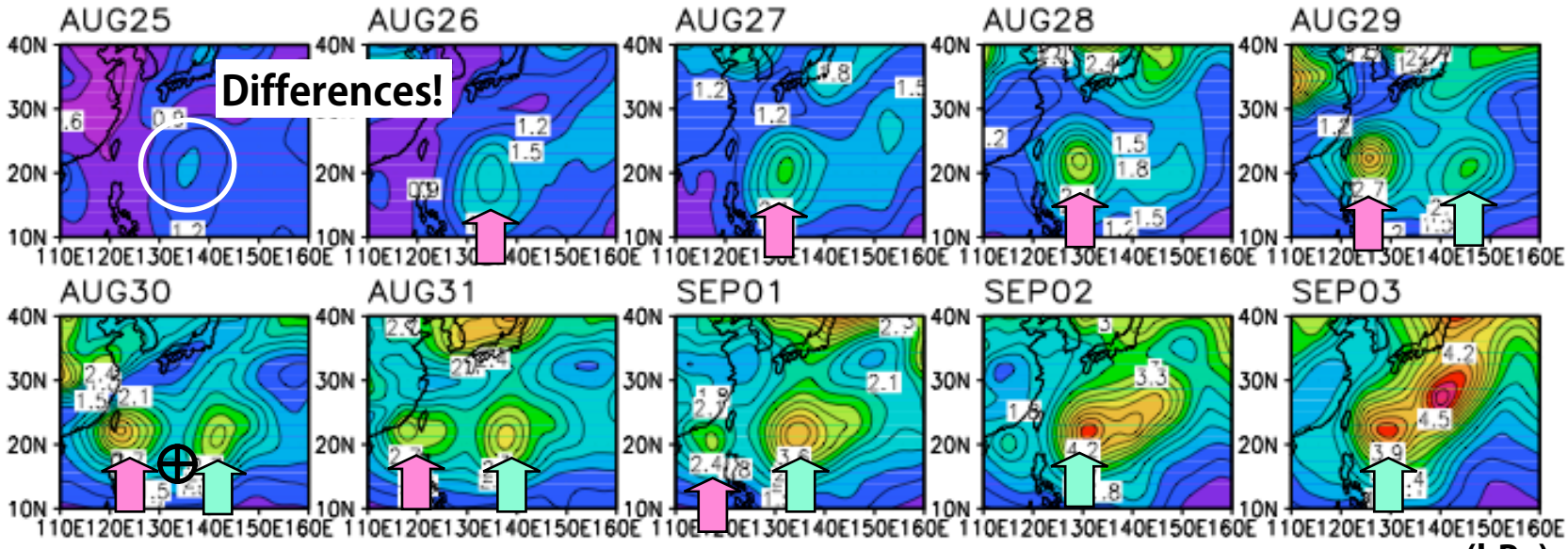
EPS 5 Day Forecasts (All 24 Members) for Typhoon Dujuan



Ensemble Mean for Surface Pressure (Initial: Aug. 25 12Z)

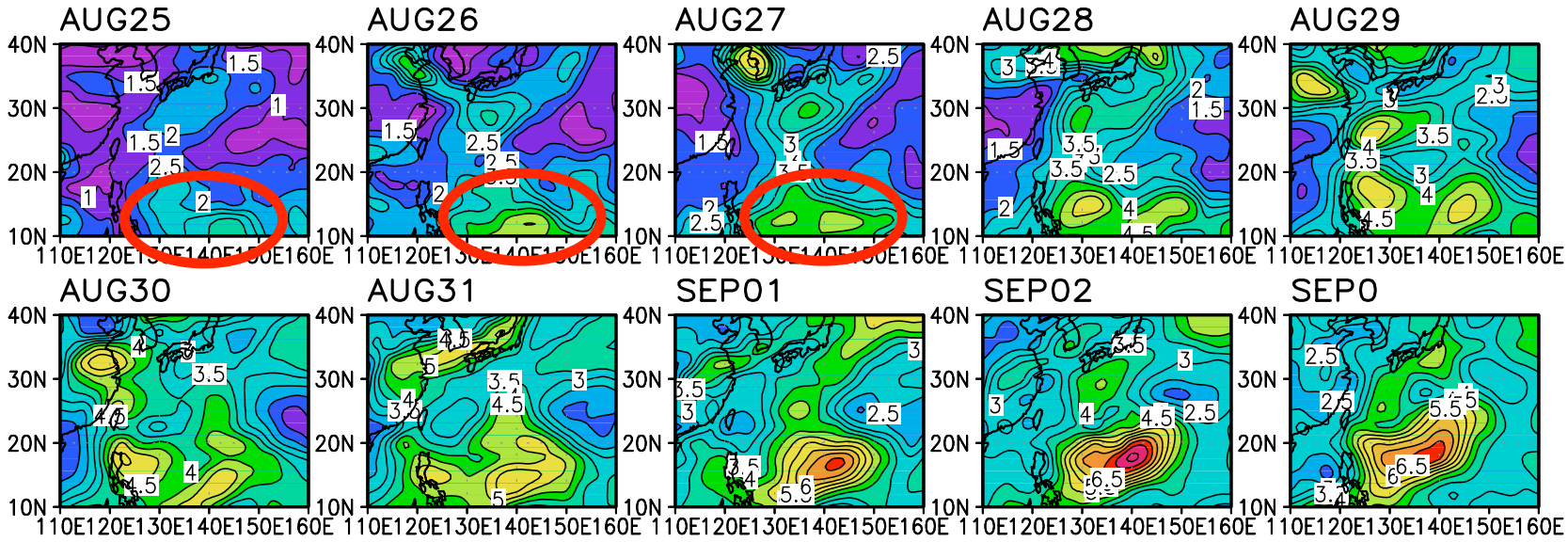


Ensemble Spread for Surface Pressure



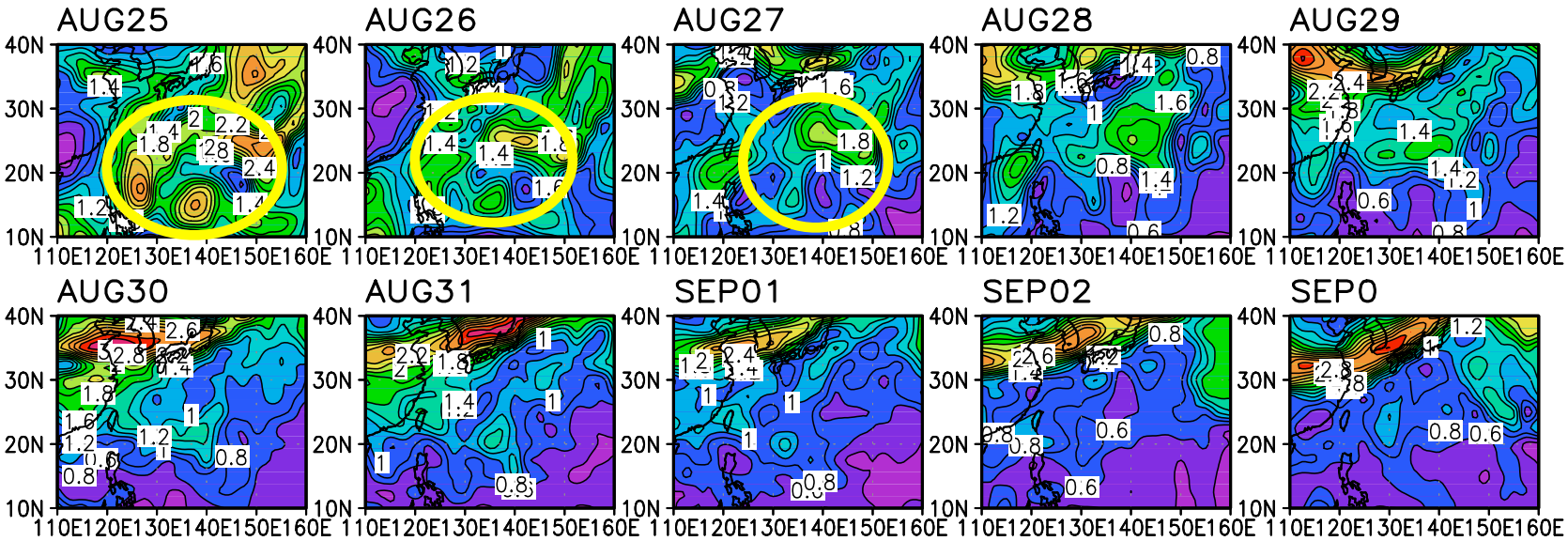
Ensemble Spread

U 850hPa



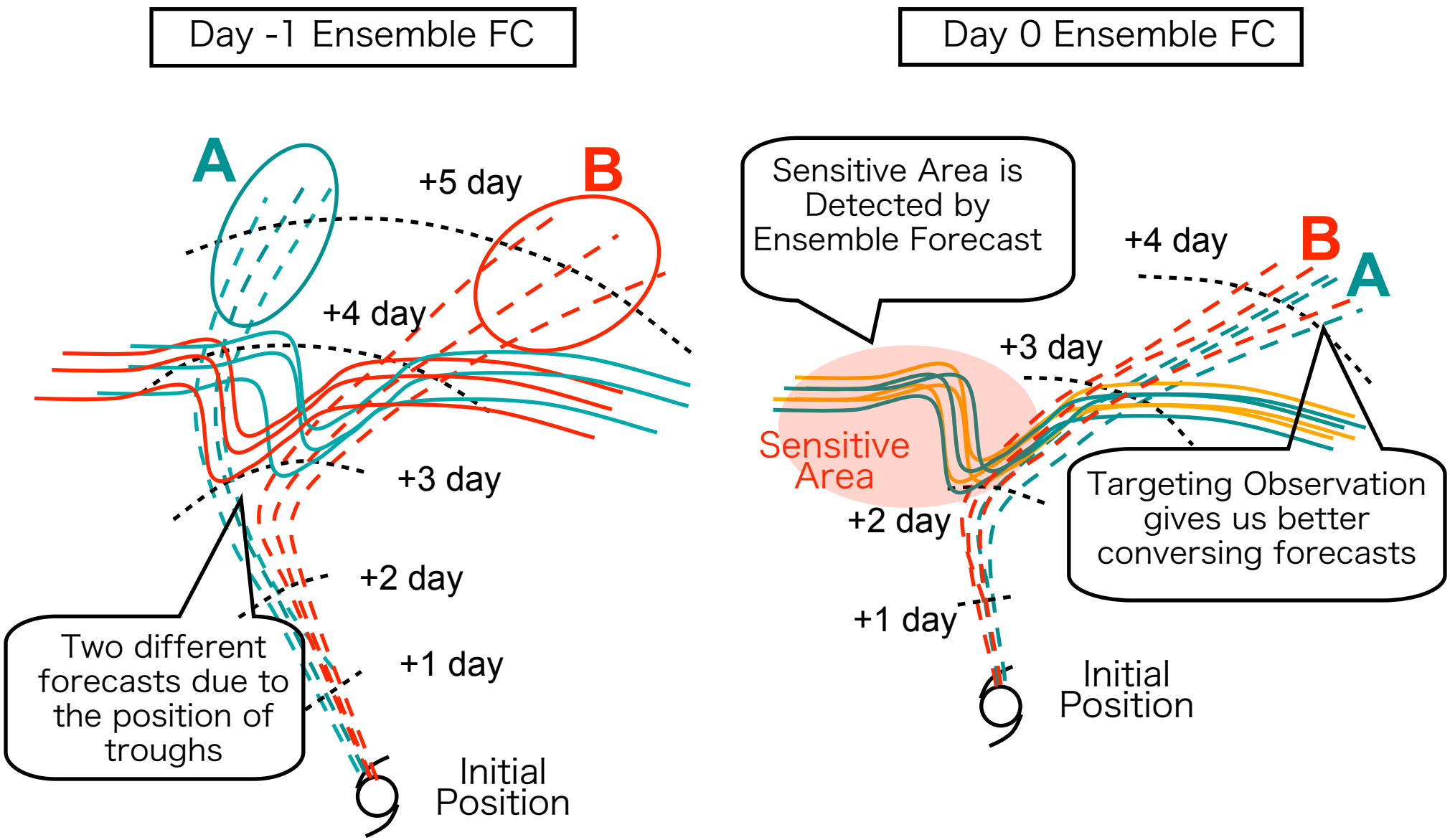
(m/s)

Specific Humidity at 700hPa



(g/kg)

Typhoon Forecast using Targeting Observation



Summary

- **THORPEX: to improve high-impact weather forecasts by using latest knowledge, such as new observing systems, 4DVAR, Ensemble Forecast and Targeting.**
- **Satellite Observation is one of the key component for THORPEX.**
- **Precipitation Measurement by GPM is crucial for Cloud Resolving Model with Moist 4DVAR to simulate typhoon and heavy rainfall event.**
- **Interactive Forecast System is one of the main concepts in the THORPEX Era.**
- **Targeting Observation by GPM for these events is promising to improve forecast skill.**